

ICP poročilo o delu 2008

ICP Annual Report 2008

POROČILO O DELU 2008
ANNUAL REPORT 2008

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Beseda direktorja

Word of the Manager



Poslanstvo Inštituta je v ustvarjanju, širjenju in prenosu znanja na področju papirništva. Inštitut zagotavlja vrhunske raziskave in razvoj na najvišji mednarodni ravni. Glavna področja, na katerih deluje Inštitut so papir in vlaknine, ekologija ter mikrobiologija. Vendar se na Inštitutu rojevajo tudi nova interdisciplinarna področja, kot so nanotehnologije, novi materiali ter okoljske tehnologije.

Da smo že več let povezani z širšim poslovnim okoljem pove naša močna navezanost z gospodarstvom, predvsem papirno in papirno predelovalno industrijo. V ta namen imamo na Inštitutu tudi ustanovljen strokovni svet, katerega člani so pomembni slovenski gospodarstveniki s papirne industrije, ki nam svetujejo in sodelujejo pri vodenju aplikativnih dejavnosti. Ker pa smo premalo povezani z malim gospodarstvom imamo namen v prihodnjem letu organizirati nekaj skupnih celodnevni delovnih srečanj s posamičnimi podjetji.

Zadnje leto je za Inštitut zelo pomembno tudi zaradi organizacijskih in kadrovskih sprememb, ki jih prinaša sprejeti sanacijski načrt ter tudi spremenjene razmere na domačem in tujih trgih.

Inštitut si že vrsto let prizadeva, da izvaja vrhunske raziskave in storitve na mednarodni ravni ter skrbi za vzgojo inovativnih kadrov na področju papirništva. Inštitut pa je bil tudi v preteklem letu tesno povezan z univerzami in inštituti po svetu.

Želel bi poudariti, da je družba vredna toliko kot je njen odnos do znanosti, znanost pa toliko kot je njen odnos do družbe. Poleg ustvarjanja je pomembno predvsem širjenje in prenos znanja.

The mission of the Pulp and Paper Institute is creativeness, spread and transfer of knowledge in the field of papermaking. The institute provides state-of-the-art research and development at the highest international level. The main working areas are fibers, paper, ecology and microbiology. At the same time new interdisciplinary activity fields, such as nanotechnologies, new materials and environmental technologies are starting to emerge.

We have been fostering for many years good relations with broader business sector, so we are closely connected to different industries, mostly to papermaking and paper converting. For this purpose we have established a research council which is composed of important Slovenian industrialists and experts who provide advice and assistance related to applicational projects management. Due to deficient relations with small business we intend to organize next year few whole day working meetings with individual small enterprises.

Last year was very important for the Institute due to organizational and personnel changes, which were related to the adopted sanation plan and to changing circumstances on domestic and foreign markets. The institute has been trying for years to promote state-of-the-art research and services on international level as well as provide top education for innovative professionals in the papermaking branch. Close cooperation with universities and research institutes from other countries continued through all year.

I would like to underline that the value of a society is reflected in its attitude towards science and vice versa. Apart from creativeness it is important to spread and transfer knowledge.

Ob tej priložnosti se zahvaljujem vsem, ki s svojim trdim in odličnim delom ter zavzetostjo prispevajo k razvoju in rasti Inštituta za celulozo in papir.

Dr. Bogomil Breznik

I take this opportunity to thank all the initiative and hard working colleagues, who contribute to development and prosperity of the Pulp and Paper Institute by their excellent work and commitment.

Dr. Bogomil Breznik



Vodstvo Inštituta za celulozo in papir

ICP Management

Upravni organi ICP

Svet ICP:

Oldrich Kettner, Vipap Videm Krško d.d.
(predsednik sveta)
Alenka Aleš, Paloma d.d.
Vladimir Brezavšček, Papirnica Vevče d.o.o.
Radenko Mijatović, Valkarton d.d.
Janko Šircelj, GZS
Nevenka Kenda, ICP
Vera Rutar, ICP

Strokovni svet ICP

Janez Kikl, Paloma d.d. (predsednik sveta)
Miloš Habrnal, Vipap Videm Krško d.d.
Marko Jagodič, Papirnica Vevče d.o.o.
Marjan Kocjančič, Papirnica Goričane
Rado Kunavar, Količevo Karton d.o.o.
Franci Mivšek, Valkarton d.d.
Vera Rutar, ICP
Bogomil Breznik, ICP

ICP Management

ICP Board

Oldrich Kettner, Vipap Videm Krško d.d.
(Board Chairman)
Alenka Aleš, Paloma d.d.
Vladimir Brezavšček, Papirnica Vevče d.o.o.
Radenko Mijatović, Valkarton d.d.
Janko Šircelj, GZS
Nevenka Kenda, ICP
Vera Rutar, ICP

Research Council

Janez Kikl, Paloma d.d. (predsednik sveta)
Miloš Habrnal, Vipap Videm Krško d.d.
Marko Jagodič, Papirnica Vevče d.o.o.
Marjan Kocjančič, Papirnica Goričane
Rado Kunavar, Količevo Karton d.o.o.
Franci Mivšek, Valkarton d.d.
Vera Rutar, ICP
Bogomil Breznik, ICP

Struktura zaposlenih

Human Resources

Struktura zaposlenih

Skupaj zaposlenih (na dan: 31.12.2008): 20, od tega:

- 5 doktorjev znanosti
- 1 magister znanosti
- 5 diplomantov
- 9 s srednjo šolo in drugo

Human resources

Total employees (as of: 31.12.2008): 20, including:

- 5 doctors of Science
- 1 master of Science
- 5 university graduates
- 9 high school graduates and others

Finančno poslovanje v letu 2008

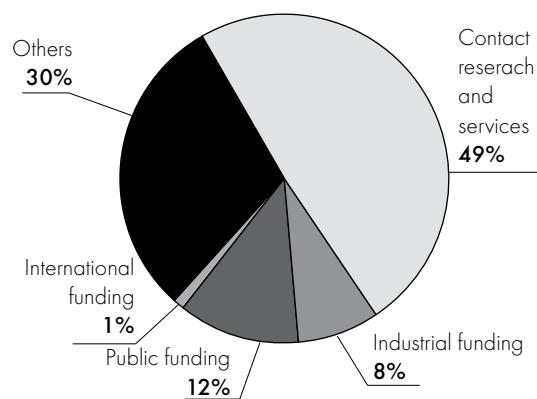
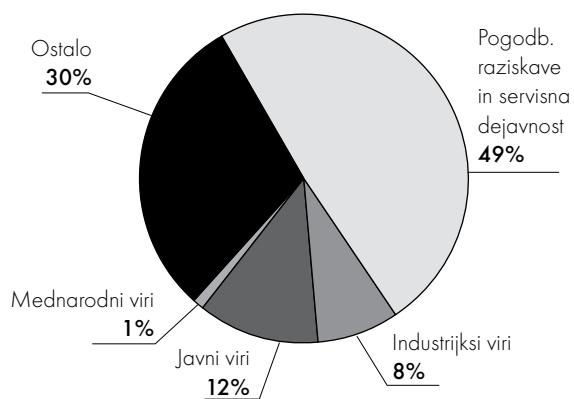
Financial Statement for 2008

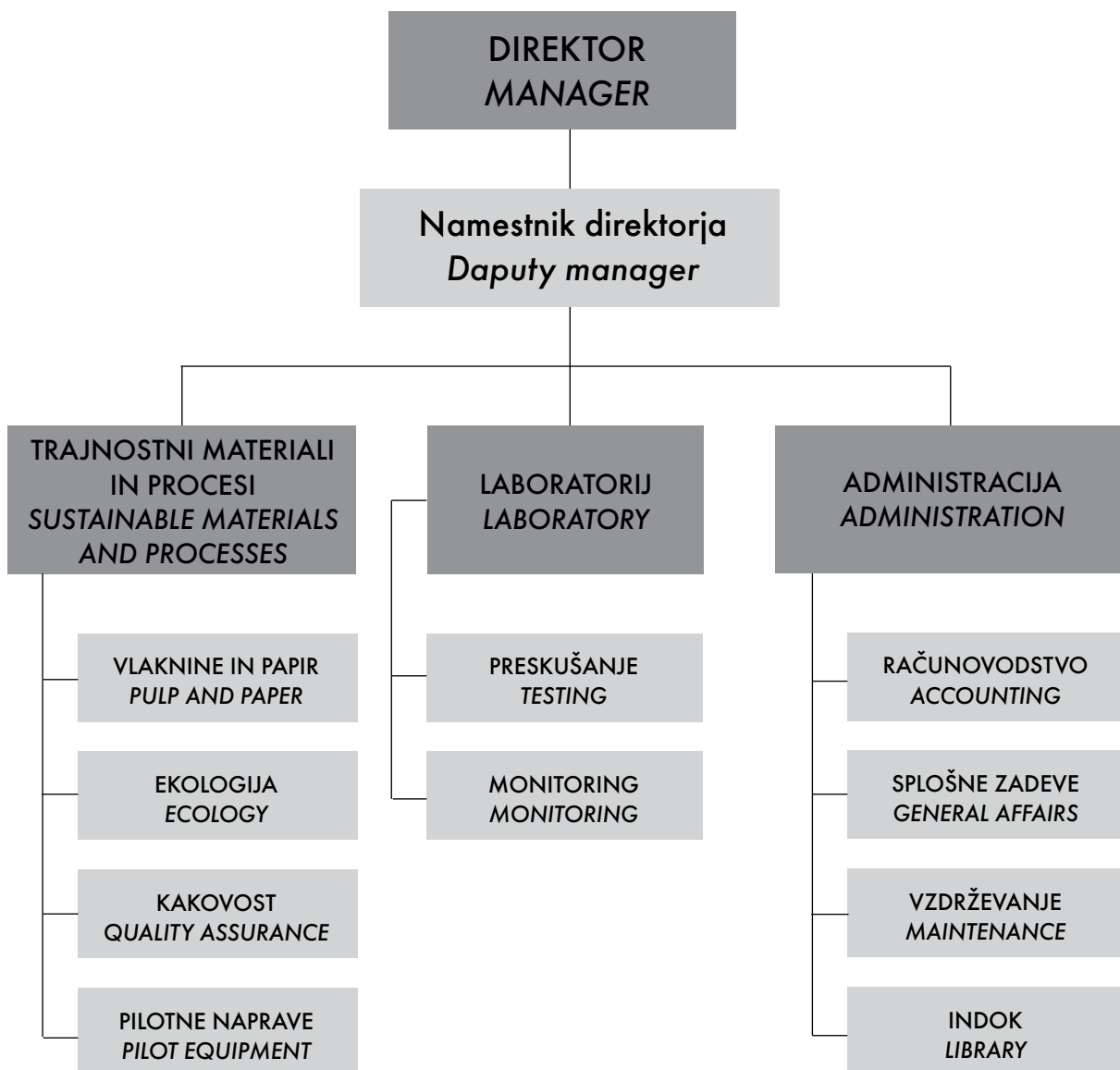
Struktura prihodkov na ICP za leto 2008

Pogodbene raziskave in servisna dejavnost	49 %
Sofinancirane raziskave (industrijski viri)	8 %
Sofinancirane raziskave (javni viri)	12 %
Mednarodni viri	1 %
Ostalo	30 %

Income Structure for 2008

Contract research and services	49 %
Industrial funding	8 %
Public funding	12 %
International funding	1 %
Others	30 %





Aktivnosti doma in v tujini

Domestic and international cooperation

Aktivnosti doma:

»Investigations On The Possibilities Of Identification Of Various Types Of Soiling And Paper Compounds Using NIR Spectroscopy«

Udeležili smo se simpozija, ki je potekal v okviru konference CHRESP: 8th EC Conference on Sustaining Europe's Cultural Heritage - Research for Protection, Conservation and Enhancement of Cultural Heritage Research, Ljubljana, Slovenija, v organizaciji Ministrstva za kulturo, ARRS in EU 7. okvirnega programa (info.: dr. Meta Černič).

»Tehnični in vsebinski problemi klasičnega in elektronskega arhiviranja Radenci 2008«

Aktivno smo sodelovali na Posvetovanju s prispevkom: »Dokumentno gradivo na papirju - Specifikacija lastnosti zaščitne embalaže« (info.: dr. Meta Černič).

Gospodarjenje z odpadki - GZO 08

Aktivno smo sodelovali na 9. strokovnem posvetovanju z mednarodno udeležbo »Gospodarjenje z odpadki - GZO 08«, ki je potekalo 28. avgusta na Otočcu s predavanjem: »Lastnosti in uporabnost s pepelom stabiliziranih bioloških blat« (info.: mag. Janja Zule, dr. Franc Černeck, Edvard Podobnik).

Slovenski kemijski dnevi 2008

Janja Zule je sodelovala na Slovenskih kemijskih dnevih 2008 s predavanjem: »Karakterizacija polifenolov v tkivih evropskega macesna« (info.: mag. Janja Zule).

10. posvetovanje o akreditaciji - Dan akreditacije '08

Kongresni center Brdo je bil 12. novembra 2008 prizorišče jubilejnega 10. letnega posvetovanja o akreditaciji, ki se ga je udeležilo več kakor 270 slušateljev. Prvi predavanja v osrednjem delu srečanja sta bili namenjeni novi evropski zakonodaji o akreditaciji. Del tega je tudi nova Uredba o akreditaciji. Posebnost 10. srečanja je bila popoldanska delavnica za kemijske in sorodne laboratorije, ki je prav tako naletela na dober sprejem med udeleženci (info.: Sebastijan Žvipelj).

12. dan papirništva in 35. mednarodni simpozij Društva inženirjev in tehnikov papirništva (DITP),

je bil tradicionalno organiziran v drugi polovici novembra 2008 na Bledu in je potekal pod geslom »Zeleni pa-

Domestic activities:

»Investigations On The Possibilities Of Identification Of Various Types Of Soiling And Paper Compounds Using NIR Spectroscopy«

We participated at the symposium which took place within the frame of the conference CHRESP: 8th EC Conference on Sustaining Europe's Cultural Heritage - Research for Protection, Conservation and Enhancement of Cultural Heritage Research, Ljubljana, Slovenia, organized by the Ministry of Culture, ARRS and 7th Framework Programme EU (info: Marjeta Černič, PH.D.)

»Technical and Field related Problem of Classical and Electronic Archiving Radenci 2008«

We actively participated at the Professional Meeting with the lecture: »Preservation of paper documents and publications-standard and recommendation for permanence and durability« (info: Marjeta Černič, PH.D.)

»Waste Management - GZO 08«

We presented a lecture at the 9th Professional Meeting with international audience »Waste Management - GZO 08«, which took place on August 28 at Otočec. The title of the lecture was »Properties and applicability of ash-stabilized biosludges« (info: Janja Zule, M.Sc., Franc Černeck, PH.D., Edvard Podobnik)

»Slovenian Chemical Event 2008«

Janja Zule participated at the Slovenian Chemical Event 2008 by the lecture: Zule, Holmbom »Characterization of polyphenols in wood tissues of European larch« (info: Janja Zule, M.Sc.)

»10th Meeting - Day of Accreditation 08«

The congress center Brdo was the scene of the 10th annual meeting on accreditation which was attended by 270 participants. The first two lectures were dedicated to the new European legislation about accreditation, a part of which is also a novel Regulation on Accreditation. The special event of the meeting was the afternoon workshop intended for the needs of chemical and other similar laboratories (info: Sebastijan Žvipelj).

»12th Day of Slovene Paper Industry and 35th International Annual Symposium DITP«

It was traditionally organized in the second part of No-

pirnčarji v modrem okolju» in »Novi izzivi v papirništvu« (info.: Dr. vera Rutar).

Aktivnosti na tujem:

COST E54

»Characterization of the fine structure and papermaking fibres using new technologies«

Udeležili smo se srečanja na TU v Gradcu, v Avstriji ter na inštitutu PRI (Hungarian Paper research Institute) v Budimpešti. Raziskovalci s sodelujočih EU univerz in inštitutov so predstavili rezultate novjših preiskav nebeljenih in beljenih celuloznih vlaken ter dosežke pri plemenitju in karakterizaciji fizikalno-kemijskih lastnosti papirniških vlaken (info.: dr. Meta Černič).

COST E41

»Analytical tools with applications for wood and pulping chemistry«

Udeležili smo se zaključnega seminarja z naslovom »Towards Understanding Wood, Fibre and Paper - deeper knowledge through modern analytical tools«, ki je potekal v Turkuju na Finskem in aktivno sodelovali s poster-sko predstavitvijo in sočasnim predavanjem z naslovom »Polyphenols in stemwood, knots and branches of European larch« (info.: mag. Janja Zule)

COST E 46

»Improvements in the Understanding and Use of Deinking Technology“

V letu 2008 sta bila dva sestanka MC, 8. in 9. sestanek, zaključni sestanek akcije ter sestanki delovnih skupin, ki so bili združeni z večjimi prireditvami. Udeležili smo se dveh prireditev, ki sta potekali v okviru COST akcije in sicer: »PTS - CTP Deinking symposium« v Leipzigu, v Nemčiji, kjer je bila vsebina predavanj posvečena postopkom priprave sekundarnih vlaknin, procesom in kakovosti končnega izdelka, vlakna in papirja ali kartona, izdelanega iz takih vlaken. Na zaključni konferenci akcije COST E 46, z naslovom »Deinkability of graphic printed materials«, v Bordeaux-ju, Francija, pa je bil poudarek na postopkih recikliranja, deinkinga in »Eco« načrtovanja in razvoja tiskarskih barv, predvsem flekso barv in postopkov.

INGEDE, mednarodno združenje industrije za deinking tehnologijo, se ukvarja z določevanjem uporabnosti ONP in OMG, ki s tiskajo predvsem v ofsetnih tehnikah tiska. Pripravljena je nova ocenjevalna lestvica (»deinkability score«), na osnovi katere se določajo nove sheme deinkanja (info.: dr. Vera Rutar).

5th international symposium »Advanced technologies in pulp and paper technology«, Romunija

Aktivno smo se sodelovali na simpoziju, ki ga je organiziralo združenje za celulozno in papirno industrijo Romunije, Ceprohart iz Braile. Vsebinsko je bil simpozij

vember 2008 at Bled and was conducted under the passwords »Green papermakers in blue environment« and New challenges in papermaking« (info: Vera Rutar, PH.D.)

International activities:

COST E54

»Characterization of the fine structure and papermaking fibres using new technologies«

We attended the meetings at TU in Graz, Austria and at PRI (Hungarian Paper research Institute) in Budapest. The researchers from the participating EU universities and institutes presented the results of the recent research related to unbleached and bleached cellulose fibers as well as achievements in coating and characterization of physico-chemical properties of paper fibers (info: Marjeta Černič, PH.D.)

COST E41

»Analytical tools with applications for wood and pulping chemistry«

We attended the final seminar with the title »Towards Understanding Wood, Fibre and Paper - deeper knowledge through modern analytical tools«, which took place at Turku, Finland where we had a poster presentation and lecture titled »Polyphenols in stemwood, knots and branches of European larch« (info.: Janja Zule, M.Sc.)

COST E 46

»Improvements in the understanding and use of deinking technology“

Two MC sessions took place in 2008 and the 8th, 9th and final action meetings as well as working group meetings, which were joined to bigger events.

We attended the following two events, which took place within the COST Action: »PTS - CTP Deinking symposium« in Leipzig, Germany, where the main topics were preparation procedures of secondary fibers, process technologies as well as quality of final products, fibers, paper or board produced from such fibers. At the final conference of COST E 46 action with the title »Deinkability of graphic printed materials«, Bordeaux, France, a special attention was paid to recycling procedures, deinking and »Eco« engineering and development of printing inks, in particular flexo inks and procedures. INGEDE, the international association of the industry for deinking technology, is engaged in determination of ONG and OMG applicability which are printed mostly in offset techniques. A new evaluation scale (»deinkability score«) is prepared, which is intended for determination of new deinking schemes (info: Vera Rutar, PH.D.)

»5th international symposium »Advanced technologies in pulp and paper technology«, Romania

We participated actively at the symposium, organized by

zelo široko zasnovan, predvsem pa je bila izpostavljena tema embalaže, deinkinga in filtracijskih materialov in procesov, predvsem pijač (info.: Dr. Vera Rutar, dr. Evgen Eržen).

9th International Conference »ART 2008«, Izrael

Aktivno smo, skupaj z ARS, sodelovali na mednarodni konferenci »9th International Conference ART 2008 - Non-destructive investigations and microanalysis for the diagnostics and conservation of cultural and environmental heritage« v Jeruzalemu, v Izraelu (info.: dr. Meta Černič).

COST-STSM-E48-3645

V okviru COST akcije E 48 je bila na študijskem obisku mlada raziskovalka Sonja Jamnicki, doktorandka iz Grafične fakultete, Univerze v Zagrebu. V okviru eksperimentalnega dela je izvedla vrsto poizkusov deinkinga in karakterizacije recikliranih papirjev, primernih za stik s hrano. Naslov njenega dela je bil: FOOD CONTACT ANALYSIS OF OFFICE RECOVERED PAPER GRADES (info.: dr. Vera Rutar, Damjan Balabanič).

the Romanian association of pulp and paper industry, Cephart from Braila. According to its programme the symposium encompassed a large variety of topics, among which the predominating were packaging, deinking, filtration materials and processes (info: Vera Rutar, PH.D., Evgen Eržen, PH.D.)

»9th International Conference »ART 2008«, Israel«

Together with ARS, we actively attended the international conference »9th International Conference ART 2008 - Non-destructive investigations and microanalysis for the diagnostics and conservation of cultural and environmental heritage« which took place in Jeruzalem, Israel (info.: Marjeta Černič, PH.D.).

COST-STSM-E48-3645

Within the framework of COST Action E 48 we hosted a young researcher Sonja Jamnicki, a PH.D. student from the Faculty of Graphic Arts, University in Zagreb. During her experimental work she performed numerous deinking experiments and characterizations of recycled papers, intended for food contact. The title of her work was: FOOD CONTACT ANALYSIS OF OFFICE RECOVERED PAPER GRADES (info: Vera Rutar, PH.D., Damjan Balabanič).



Nanotehnologija v papirništvu

Nanotechnology in papermaking

Kaj je »nano«? Prvo vprašanje, ki se pojavi pri temi nanotehnologije je: kako veliko oziroma kako majhno? Če je definicija tehnologije »uporaba znanosti in znanstvenih znanj za potrebe industrije ali komercialne cilje«, potem je definicija nanotehnologije: »uporaba znanosti in znanstvenih znanj v velikostnem nano področju za potrebe industrije ali komercialne cilje«. Torej je odločujoč faktor velikostni faktor posameznega delca.

Nano tehnologija obravnava delce velikosti od 1 - 100 nm, ki so različnega izvora: od ogljika, kovin, mineralov, polimerov do silike in silikatov. Osnovna značilnost je izredno velika specifična površina. Delci v nano velikostnem območju so v uporabi že vrsto desetletij, projekt Sustainpack pa zajema tudi nano delce v papirništvu in sicer nano fibrile in nano pigmentne delce.

Tehnični izzivi so naslednji:

- prenos iz laboratorijskega v industrijski okvir
- poznavanje lastnosti, ki jih dajejo nano materiali
- spreminjanje znanosti v prakso
- kontrola, standardizacija, klasifikacija in poznavanje tveganj

Nano tehnologija je enačba za papirje z dodano vrednostjo. Prednosti nano delcev in tehnologije so izredne:

- premazi so večdimenzionalno tanjši, bolj gladki in beli
- osnovni papirji vsebujejo več polnil in manj dragih vlaken
- veliko vrst papirjev postaja vedno lažjih, vendar močnejših
- papirništvo postaja čistejše, bolj »zeleno« in energetsko bolj učinkovito

Nano-znanost v papirništvu se začne pri drevesu, ki je izjemen primer naravne tovarne nano delcev. Drevesa so tovarne izrednih količin nano celuloze, ki jo izoliramo in uporabimo oziroman vključimo v nove izdelke.

Retencijski kemizmi na bazi nano delcev izboljšajo lastnosti papirjev in kartonov. Z izboljšanjem formacije in porazdelitvijo polnil v kombinaciji npr s škrobom in ali drugimi polimeri lahko dosežemo učinkovit papirniški sistem, ki omogoča izredne lastnosti papirja za tisk, predelavo, embalažne namene, itd.

What is »nano«? The first question related to the topic of nanotechnology is how big or as the case may be how small? If the definition of the technology is »application of scientific knowledge for commercial and industrial purposes« than the definition of nanotechnology is »application of scientific knowledge in the magnitude of nano range for commercial and industrial purposes«. The decisive factor is the magnitude of individual particles.

Nanotechnology considers particles with size between 1 and 100 nm which are of different origin from carbon, metals, minerals, polymers to silica and silicates. The basic feature is a big specific surface (BET, g/m²). Particles in nano range of magnitude have been used already for several decades. The project Sustainpack encompasses also nano particles in papermaking, namely nano fibriles and nano pigments.

The technical challenges are:

- transfer from laboratory to industry
- knowledge of the properties of nano particles
- conversion of science to practices
- control, standardization, classification and risk identification

Nanotechnology is equation for papers with added value. The advantages of nano particles and technologies are exceptional:

- coatings are multidimensionally thinner, smoother and white
- base papers contain more fillers and less expensive fibers
- numerous paper grades are increasingly lighter and stronger
- papermaking is getting cleaner, more »green« and energetically more efficient

Nanotechnology in papermaking starts with tree, which is a unique example of natural production of nano particles. Trees are producers of enormous amounts of nano cellulose, which is isolated and used for manufacture of new products.

Retention mechanisms based on nano particles upgrade paper and cardboard properties. By improved formation and filler distribution in combination with starch or other polymers we may attain efficient papermaking system,

Izrednega pomena je tudi nano inženiring premaznih komponent, npr. veziv.

Nano struktura veziv vpliva na višjo odpornost premazane površine papirja, izboljša potiskljivost, predvsem kadar so uporabljene TB z višjo lepljivostjo.

Nano tehnologija omogoča uporabo nano delcev in polimerov, združenih v kompozite, ki imajo specialne lastnosti zapore. Primer so kaolinski nano kompoziti, pretežno montmorilonitne ploščice z dimenzijami 1 nm debeline in 100 do 200 nm dolžine in širine, ki so povezane s polimernimi molekulami in na tak način niso več mobilne v polimeru. Prednosti takih kompozitov in nastale zapore na površini vlaknatega nosilca so višja togost, mehanska odpornost in druge specialne lastnosti.

Nano tehnologija za aktivno embalažo?

Poleg kisikovih absorberjev se vedno bolj uveljavljajo različni oksidi, ki imajo antimikrobne lastnosti (cink oksid ali različni titanovi oksidi oziroma titanati).

Nano v premazu oziroma premaznem sloju?

Nanotehnologija preplavlja svet, tako tudi v papirništvu postaja vedno bolj zanimiva. V premaznem sloju nano delci vplivajo na drugačno poroznost, porazdelitev velikosti in položaja por in vplivajo na velike spremembe optičnih lastnosti in potiskljivosti. Ugotovljeno je bilo, da kaolinski pigmentni delci v območju < 100 nm debeline izboljšajo togost v večji meri kot običajni kaolinski delci v premaznem sloju.

Cilj projekta, ki je bil izveden v sodelovanju z industrijskim partnerjem in sofinanciran s strani TIA (Agencija za tehnološki razvoj) je bil doseči čim višji sijaj in spremljati vpliv velikosti pigmentnih delcev v nano velikostnem območju na druge lastnosti premazanega papirja, predvsem barierne lastnosti za zrak, olja in vodo (info.: dr. Vera Rutar)

Zeleni procesi in energija

Slovenska papirna industrija je za varovanje okolja uvedla sodobne postopke čiščenja odpadnih vod in tako tudi na tem segmentu izpolnila zahteve IPPC direktive (Integrated Pollution Prevention and Control, 96/61/EC).

Seznam najboljših uveljavljenih tehnik (BAT) predvideva za sekundarno (biološko) čiščenje bodisi aerobno čiščenje bodisi kaskado anaerobnega in aerobnega čiščenja. Anaerobno / aerobni postopek je ekonomsko bolj zanimiv, saj ustvarja presežek energije v obliki z metanom bogatega bioplina.

which enables unique properties of paper intended for printing, converting, packaging and others.

Nano-engineering of coating components, such as binders is also of the utmost importance.

Nano structure of binder contributes to higher resistance of coated paper surface and improves printability, in particular in cases when TB with higher tack are used.

Nano technology enables use of nano particles and polymers, merged in composites, which have special barrier properties. A model example are nano composites with kaolin, in shape of plates with dimensions of 1 nm of thickness and 100 to 200 nm of length and width which are connected by polymeric molecules in a manner which prevents any moving in polymer. The advantages of such composites and resulting barrier on the surface of the fibrous carrier are higher stiffness, mechanical resistance and other specific properties.

Nanotechnology for active packaging?

In addition to oxygen absorbers different oxydes with antimicrobial properties are becoming more and more important (zinc oxyde or different titanium oxydes or titanates).

Nano in coating or in coating layer?

Nanotechnology is overflowing the world and so it is also interesting for papermaking. Nano particles impact the porosity in the coating layer as well as pore size and position. They also influence big changes of optical properties and printability. Nano pigments will help improve mechanical properties in the future as it has been established that kaolin particles in the range < 100 nm of thickness upgrade stiffness more than usual kaolin particles in coating layer.

The purpose of the project which was accomplished in cooperation with the industrial partner and cofinanced from the part of TIA (Slovenian Technology Agency) was achievement of high gloss and monitoring of the impact of pigment particle size in nano range on other properties of coated paper, most of all barrier properties for air, oil and water (info: Vera Rutar, PH.D.)

Green processes and energy

Slovenian paper industry introduced modern effluent treatment techniques in care for the environment and thus complied in this segment with the requests of the IPPC directive (Integrated Pollution Prevention and Control, 96/61/EC).

The list of best available techniques (BAT) envisages for secondary or biological treatment either aerobic process or a combination of anaerobic and aerobic treatment. The latter is more interesting from economic point of view as it produc-

Kot stranski produkt anaerobne razgradnje nastali bioplin je mogoče z uporabo primerne pretvornika (plinska turbina, plinski motor, parni kotel,...) pretvoriti v koristno delo oz. energijo. Ena izmed najpogosteje uporabljenih možnosti je pretvorba kemične energije bioplina v električno energijo z uporabo električnega generatorja, ki je sklopljen z mehanskim pretvornikom.

Z dodajanjem organske snovi v vstopno vodo (dohranjevanjem) lahko dvignemo koncentracijo hranil na nivo, ki bo zagotavljal stabilno delovanje anaerobne stopnje čistilne naprave in povečal učinkovitost nastajanja energenta, ki ga je mogoče koristno uporabiti.

Te snovi se sedaj obravnavajo kot odpadki, predstavljajo pa zaradi svoje sestave odličen vir hrane za mikroorganizme in s tem posredno v anaerobni stopnji pridobimo več bioplina.

Biološka čistilna naprava je živ organizem in se zato odziva na spremembe iz okolja. Sestava mikroflore se prilagodi sestavi odpadne vode, ki v napravo vstopa. Sunkovite spremembe v sestavi vstopajoče vode imajo na mikrofloro negativen (zaviralni) učinek in lahko povzročijo celo propad kolonije.

Cilji projekta, ki je bil izveden v sodelovanju industrijskega partnerja in sofinanciran s strani TIA (Agencija za tehnološki razvoj) so bili:

- doseči enakomerno obremenitev biološke čistilne naprave,
- z optimizacijo delovanja anaerobne stopnje biološkega čiščenja doseči produkcijo plina med 400 m³ in 600 m³ na tono odstranjenega KPK,
- dvigniti povprečno moč motorja za 160 do 170 kW in tako povečati proizvodnjo »zelene« (»obnovljive«) elektrike za 1400 MWh.

Načrtovane eksperimente, ki so služili kot izhodišče za pripravo načrta dohranjevanja industrijske čistilne naprave, smo izvedli v dveh fazah. V prvi fazi smo posamične izbrane substrate testirali na laboratorijskem nivoju v napravi za določanje BPK. Na podlagi teh testov je bila določena biorazgradljivost in toksičnost preizkušene substrata z mikrofloro anaerobne čistilne naprave, nato pa smo pripravili ustrezne kombinacije za testiranje na pilotnem reaktorju (info.: mag. Janja Zule, Edvard Podobnik).

Raziskovalno-razvojna, strokovno-pospeševalna in svetovalna dejavnost

V letu 2008 so aktivnosti potekale v obliki projektov, pridobljenih na Javnem razpisu za spodbude tehnoloških

es surplus of energy in the form of methane reach biogas. This byproduct of anaerobic digestion can be converted by application of suitable converter (gas turbine, gas engine, steam boiler,...) to useful work or energy. One of the most important possibilities is transformation of chemical energy of biogas to electric energy by application of electric generator which is coupled to mechanical converter.

By adding organic matter to the incoming water (additional feeding) it is possible to increase the concentration of feedstuff to the level which will ensure stable operation of the anaerobic stage of the plant and enable more efficient exploitation of the generated biogas.

These additional materials are currently treated as wastes, however they represent an excellent nutrition source for microbes, due to their chemical composition. As a consequence more biogas can be produced in the anaerobic stage.

Biological water treatment plant is a living organism so it responds to the environmental changes. The structure of its microflora can adapt to the incoming effluent composition, however some abrupt chemical changes of water negatively impact microbe colonies, so the latter may be completely destroyed.

The goals of the project which was carried out in cooperation with industrial partner and was cofinanced by TIA (Slovenian Technology Agency) were as follows:

- attainment of a uniform loading of the biological effluent treatment plant
- biogas production in the range between 400 m³ and 600 m³ per tonne of removed COD through optimization of anaerobic stage operation
- uplift average engine power by 160 to 170 kW and thus increase »green« (renewable) electricity production by 1400 MWh

The scheduled experiments, which served as the starting point for preparation of a plan for supplemental feeding of the industrial treatment plant were performed in two stages. First individual substrates were tested by means of BOD equipment on laboratory level in the first stage. On the basis of these tests biodegradability and toxicity of substrates were evaluated by using microflora of the anaerobic treatment plant. Afterwards, adequate combinations were prepared for tests on a pilot reactor. (info: Janja Zule, Edvard Podobnik)

Research, development and profession-promoting activities, consulting

In 2008 different activities were carried out within projects, acquired on the Public call for proposals concerning stim-

centrov, razvojnega dela za posamezne domače in tuje partnerje in izdelavi različnih vrst trajnih in arhivskih papirjev na polindustrijskem PS-ICP.

V okviru Tehnološkega centra papirništva (TCP) smo zaključili projekt »Optimiranje lastnosti premazanega kartona za tisk in površinsko zaščito grafičnega in embalažnega izdelka«.

Površinsko oplemenitenje je pomemben člen proizvodnega procesa izdelave papirja/kartona in tiskanega embalažnega in grafičnega izdelka. Cilj raziskave je bil optimiranje strukturnih, površinskih in sorpcijskih lastnosti ter mehanske odpornosti specialnih premazanih vrst kartona za tisk, pri uporabi novejših tehnik površinske zaščite z UV lakiranjem in laminiranjem s polimerno folijo, pri izdelavi visoko kakovostnih izdelkov za grafične in embalažne namene, v proizvodnem programu papirnice Radeče Papir.

Rezultati laboratorijskih, polindustrijskih in industrijskih poskusov so pokazali, da so pri optimiranju sestave in strukture kartona in premaza dosežene želene vrednosti osnovnih in strukturnih lastnosti. Pri izvedbi industrijskih poskusov smo izvedli optimiranje sorpcijskih lastnosti pri površinskem oplemenitju z uporabo specialnih pigmentov, kar je vplivalo na veliko izboljšanje enakomernosti in s tem tiskovnih lastnosti premazanega kartona. Na osnovi doseženih rezultatov smo pripravili:

- a) smernice za opredelitev kakovosti osnovnega kartona za premazovanje glede na surovinsko sestavo in tehnološke pogoje izdelave,
- b) smernice za opredelitev kakovosti premazanega kartona za tiskanje in površinsko zaščito tiskanega izdelka glede na enakomernost, sorpcijske in barvometrične lastnosti in
- c) smernice za opredelitev kakovosti potiskanega grafičnega in embalažnega izdelka.

Projekt se je zaključil z izdelavo novega izdelka, specialnega premazanega kartona, saj so rezultati omogočili naročniku razvoj in izdelavo novih, visoko kakovostnih vrst premazanega kartona za tiskanje in izdelavo specialnih vrst izdelkov za grafične in embalažne namene (info.: Dr. Marjeta Černič).

ulation of technological centers, developmental work for individual domestic and foreign partners and manufacture of different grades of durable and archive papers by means of pilot paper machine - ICP.

Within the Technological centre of papermaking (TCP) we finished the project »Optimisation of coated cardboard properties for printing and surface protection of graphic and packaging products«.

Surface treatment is an important stage of the paper and cardboard production process as well as printed packaging and graphic products manufacture. The purpose of the research was optimization of structural, surface and sorption properties as well as mechanical resistance of speciality coated cardboard grades intended for printing, using novel techniques of surface protection with UV varnishing and lamination with polymer foil in the production of high quality products for graphic and packaging purposes within the production programme of the paper mill Radeč Papir.

The results of the laboratory, pilot and industrial experiments indicated, that the target values of the basic and structural properties had been attained through optimization of cardboard composition and structure. During industrial trials we performed optimization of sorption properties with surface treatment using special pigments which contributed to great improvement of uniformity and consequently better printing properties of coated cardboard. On the basis of attained results we prepared:

- a) guidelines for defining quality of base cardboard intended for coating according to its composition and technological conditions of manufacture
- b) guidelines for defining quality of coated cardboard for printing and surface protection of printed product according to uniformity, sorption and colorimetric properties
- c) guidelines for defining quality of printed graphic and packaging product

The project was terminated by manufacture of a new product, special coated cardboard as the results enabled development and production of novel, high quality grades of coated cardboard for printing and manufacture of special types of products for graphic and packaging purposes (info: Marjeta Černič, PH.D.)

Ekologija

Ecology

V letu 2008 smo bili zelo dejavni tudi na področju ekologije. Naše aktivnosti so potekale med drugim tudi v obliki projektov, pridobljenih na Javnem razpisu za spodbude tehnoloških centrov. V okviru Tehnološkega centra papirništva (TCP) smo uspešno zaključili tri projekte za partnerje iz tovarn, projekti pa so bili sofinancirani s strani TIA (Agencija za tehnološki razvoj). Pri projektu »Fiksacija anionskih motečih snovi« smo testirali učinkovitost različnih visokomolekularnih fiksirnih sredstev kot so poli-aluminijev klorid, polivinilamin, visoko molekularni polivinilamin in poli-dialildimetilamonijev klorid za odstranjevanje motečih snovi kot so koloidi in škrob iz procesnih vod. Dokazali smo, da je možno v večji ali manjši meri zadržati suspendirane organske snovi in del škroba na vlaknih in jih tako odstraniti iz procesne vode, kar posledično privede do nižje obremenjenosti slednje (info.: dr. Evgen Eržen, mag. Janja Zule).

V okviru projekta »Belina deinkanih vlaknin« smo pregledali mikrobiološko in kemijsko stanje procesnih voda in vlaknin v procesu deinkanja. Na podlagi pregleda stanja smo predpostavili nekaj možnih vzrokov za nezadostno belino končne vlaknine in predlagali uvedbo ustreznih ukrepov in postopkov, ki bi morali zagotoviti doseganje stabilne beline deinkanih vlaken nad ISO 67%. V procesu deinkanja namreč poseben problem predstavljajo papirji, potiskani v flexo tehniki, saj se pri tej tehniki kot pigmentna veziva uporabljajo vodotopni in vododisperzni polimeri, ki so v pogojih razpuščanja papirja neobstojni in tvorijo fino makromolekularno disperzijo, ki se veže na vlaknine in jih obarva. Disperzije zaradi njene narave ni možno odstraniti s flotacijo (info.: dr. Evgen Eržen, mag. Janja Zule)..

V okviru projekta »Bioplin in zelena električna energija« smo proučili možnost za dodajanje različnih organskih substratov oz. stranskih produktov iz industrijske predelave naravnih organskih snovi kot dodatnega hraniva za anaerobno biološko vodočistilno napravo, s pomočjo katere pridobivajo bioplin, ki je namenjen generaciji električne energije preko sklopljenega sistema plinskega motorja in električnega generatorja s čimer je zagotovljena izkoriščenost zmogljivosti plinskega motorja. S pomočjo pilotnih poskusov dohranjevanja na modelu anaerobnega pretočnega bioreaktorja, ki smo jih izvajali na Kemijskem inštitutu v Ljubljani, smo testirali učinkovitost različnih industrijskih odpadnih materialov kot so surovi glicerol,

In 2008 we were intensively occupied with solving ecological problems. Our activities were also partly conducted within projects, acquired on the Public call for proposals concerning stimulation of technological centers. Within the frame of the Technological center of paper-making (TCP) we successfully finished three projects for industrial partners, while the projects were co-funded by TIA (Slovenian Technology Agency). Within the project titled »Fixation of anionic detrimental substances« we tested efficiency of different high molecular weight fixing agents, such as poly-aluminium chloride, polyvinylamin, polyvinylamin of high molecular weight and poly-dialyldimethyl ammonium chloride for removal of detrimental substances, as for example colloids and starch from process waters. We proved, that it was possible to retain more or less efficiently suspended organic particles and a part of starch on fibers and in this way remove them from process waters, which consequently leads to their reduced pollution (info: Evgen Eržen, PH.D., Janja Zule, M.Sc.)

We tested microbiological and chemical quality of process waters and fibers from deinking within the project »Brightness of deinked fibers«. According to the analytical results of current technological conditions we presumed several possible causes for inadequate brightness of fibers and suggested introduction of necessary measures and procedures for attainment of stable brightness of deinked fibers above ISO 67 %. In the process of deinking a special problem represent papers, printed in flexo technique where pigment binders are used which are water soluble and water dispersible polymers. They are unstable under pulping conditions and form fine macromolecular dispersion, which binds to fibers and stains them. Due to its chemical nature the dispersion can not be removed by flotation (info: Evgen Eržen, PH.D., Janja Zule, M.Sc.).

Within the project »Biogas and green electric energy« we studied the feasibility of adding different organic substrates or by-products from industrial processing of natural organic substances as supplemental nutrients for anaerobic biological water treatment plant on which biogas is produced. The latter is used as fuel for generation of electric energy through coupled system of gas engine and electric generator. By this arrangements the capacity utilization of the gas engine is ensured. By the help of pilot experiments with supplemental feeding, using a model anaerobic flow-through bioreactor, which

odpadne maščobe, pivovarniške brozge, odpadni metanol in podobni odpadki za dohranjevanje anaerobnega reaktorja. Zaradi verodostojnosti smo teste izvajali z realno industrijsko vodo in realno mikrofloro. S poskusi smo identificirali najprimernejše substrate in tehnološke pogoje dohranjevanja. Hkrati smo ocenili sprejemljivost in ekonomičnost posameznih postopkov za pridobivanje bioplina na industrijskem nivoju. Testirali smo tudi maksimalni hidraulični potencial anaerobnega bioreaktorja (maksimalno možno obremenitev), ki odpira možnost nadgradnje generatorskih kapacitet (info.: dr. Evgen Eržen, mag. Janja Zule).

Na razpisu JAPTI: »Spodbujanje formiranja interdisciplinarnih razvojnih skupin za delo na tehnološko razvojnih projektih podjetij« smo za podjetje Fenolit iz Borovnice pripravili pregled literature, analizo trga in izdelali študijo komercialno zanimivih postopkov, po katerih se proizvajajo kisli reaktivni premazi za samokopirne papirije. Izdelali smo tudi vzorčni primer oz. specifikacijo za tržno zanimiv produkt AF smole za uporabo v papirništvu, ki bi bila v nadaljevanju lahko predmet nadaljnega razvoja ter uporabe lastnega znanja in tehnoloških zmogljivosti (info.: dr. Evgen Eržen, mag. Janja Zule)..

Ostale aktivnosti v letu 2008

Prijave na razpisih

V juniju smo se prijavi na Javni razpis za koncesijski infrastrukturni program (ARRS-RI-IP-04/2008) v okviru raziskovalno-razvojne dejavnosti ICP, kot »Center za papirništvo, grafično in embalažno dejavnost ter ohranjanje dediščine na papirju«. Prijava je bila uspešna, tako da smo pridobili koncesijski infrastrukturni program za 6 letno obdobje 2009-2014.

V juniju 2008 smo izvedli prijavo na Javni razpis za sofinanciranje nakupa tuje znanstvene literature (ARRS), ki je vključevala specialno bazo podatkov Paperbase Database - »Paperbase International« in posamezne tuje znanstvene revije, ki je bila realizirana v 25% zaprosenih sredstev.

Žal smo bili manj uspešni pri prijavi aplikativnih projektov ARRS, kjer smo bili partnerji pri predlaganem temeljnem projektu Biotehnične fakultete, in sicer Oddelka za lesarstvo. V prijavljenem projektu z naslovom »Sekundarne spremembe in bioaktivni ekstraktivi v lesu nekaterih domačih drevesnih vrst« smo želeli aplicirati naše znanje in dolgoletne izkušnje s področja karakterizacije lesnih ekstraktivov pri ugotavljanju sprememb v reakcijski coni ranjenega lesa in razumevanju obrambnih mehanizmov drevesa. V sodelovanju z NTF smo bili partnerji pri predlaganem aplikativnem projektu »Tehnologije mikrokap-

were performed at the National Institute for Chemistry in Ljubljana we tested the efficiency of different industrial waste materials, such as raw glycerol, waste fats, brewery sludges, waste methanol and similar wastes as nutrients in anaerobic reactor. For the credibility reasons the experiments were performed with industrial water and existing microflora. The most suitable substrates as well as technological parameters of supplemental nutrition were identified during tests. At the same time we evaluated admissibility and economy of individual procedures for biogas production on industrial level. We also tested maximum hydraulic potential of the anaerobic reactor (maximum feasible loading) which opened up the feasibility for upgrading generator capacities (info: Evgen Eržen, PH.D., Janja Zule, M.Sc.)

JAPTI call for project applications »Promotion of formation of interdisciplinary developmental group for work on technological and developmental projects of companies« started partnership with the company Fenolit, Borovnica. Within the adopted project we prepared literature review, market analysis and elaborated study of commercially interesting procedures for manufacture of acidic reactive coatings for carbonless papers. We produced also a sample case and specification for a marketable product of AF resin which may be used in papermaking. The latter could be later on the subject of further development and application of own knowledge and technological facilities (info. Evgen Eržen, PH.D., Janja Zule, M.Sc.)

Other activities in 2008

Participation in public calls for project applications

In June we applied at the Public call for infrastructural programme concessions (ARRS-RI-IP-04/2008) within the frame of research and developmental activities of ICP, as »Center for papermaking, graphics, packaging and preservation of heritage on paper«. The application was successful, so we acquired the concession for infrastructural programme for 6 years for the period between 2009 to 2014.

In June 2008 we also applied at the Public call for co-funding of purchase of foreign scientific literature (ARRS), which comprised a speciality data base »Paperbase Database - Paperbase International« and some foreign scientific journals. The application was partly realized with acquisition of 25 % of requested funding.

Unfortunately we were less successful by application for ARRS research projects where we were partners in a proposed basic project of the Biotechnical faculty - Department of Wood Technology. In the applied project titled »Secondary changes and bioactive extractives in wood

suliranja za novo generacijo izolacijskih in biocidnih materialov« v sklopu katerega bi razvijali mikrokapsulirane materiale in mikrokapsulirane biocide za vgrajevanje v polizdelke in končne izdelke v gradbeništvu. Tudi ta prijava žal ni uspela.

Sodelovali smo pri prijavi Raziskovalnega projekta v okviru ciljnega raziskovalnega programa »Konkurenčnost Slovenije 2006-2013« v maju leta 2008 (CRP - KS 2008) s projektom »Razvoj tržnih oblik prodaje gozdnih lesnih sortimentov«

Sodelovali smo pri najavi prijave Raziskovalnega projekta v okviru ciljnega raziskovalnega programa »Znanje za varnost in mir 2006-2010« v januarju 2008 (JP-CRP - MIR 2008) skupaj z UL- Fakulteta za gradbeništvo in geodezijo, s projektom »Primernost kartografskih papirjev in barv za vojaško terensko uporabo«.

Tehnološki projekti in storitve

S slovensko papirno, papirno predelovalno, kemijsko in grafično industrijo smo sodelovali pri spremljanju kakovosti vlaknin, optimiranju mletja vlaknin, spremljanju kakovosti specialnih polnil in pigmentov, spremljanju kakovosti papirja pred in po rekonstrukciji posameznih delov papirnega stroja, izvajanju meritev posameznih specialnih analiz papirja, kartona, lepenke, valovitega kartona in končnih izdelkov.

Skozi vse leto smo aktivno sodelovali pri reševanju vsakovrstne okoljske problematike v podjetjih in opravljali kemijske in biološke analize za naročnike. Raziskovali smo pojav nastanka biofilmov, sluzi ter širjenja neprijetnega vonja zaradi razkrojnih procesov, kar neposredno vpliva na proizvodnjo in kakovost izdelkov. Ovrednotili smo mikrobiološko obremenjenost procesnih vod in mikrobiološko kakovost končnih izdelkov različnih slovenskih proizvajalcev papirja. Nudili smo podporo tehnologom pri kontroli delovanja biocida Persana in preverjali možnosti novih aplikacij Persana in vodikovega peroksida za različne tehnološke namene.

S pomočjo nove instrumentalne analize opreme (GC-MS tehnika) smo razširili obseg parametrov, ki jih določamo v tehnoloških vodah in izlužkih vlaknin, papirja in trdnih odpadkov. Osredotočili smo se predvsem na identifikacijo in kvantifikacijo endokrinih motilcev, ki spreminjajo delovanje hormonskega sistema in so zato zdravju škodljivi. Med spojine, ki se pojavljajo v papirniških sistemih in so potencialni motilci, prištevamo tudi ftalate, policiklične aromatske ogljikovodike, alkilfenole in pentaklorfenol. Slednji so komponente pomožnih sredstev, lepil, tiskarskih barv, antipenilcev, čistilnih sredstev, emulgatorjev in biocidov. V skladu z evropsko direktivo »EU Water Framework

of some domestic tree species« we wanted to use our knowledge and long-standing experiences related to characterization of wood extractives. Our experience may be useful in evaluation of changes in reaction zone of wounded tree and understanding of plant defense mechanisms.

In cooperation with NTF we were partners in an application project proposal »Technologies of microcapsulation for new generation of isolation and biocide materials«. According to the programme we would be developing microcapsulated materials and biocides for incorporation into semi-products and end-products for building industry. The application failed.

We participated at the Public call for target research programmes »Slovenian competitiveness 2006-2013« in May 2008 (CRP - KS 2008) with the project »Development of marketable modes of sale of forest and wood assortments«.

We were also engaged in January 2008 with the nomination of the project within the frame of the target research programmes »Knowledge for security and peace 2006-2010« (JP-CRP-MIR 2008) together with the Faculty of Civil and Geodetic Engineering. The title of the projects was »Suitability of cartography papers and inks for military field use«.

Technological projects and services

We cooperated closely with the Slovenian papermaking, paper converting, chemical and graphic industries by surveillance of fiber quality, optimization of fiber refining, quality evaluation of specialty fillers and pigments, characterization of paper properties before and after reconstruction of different parts of paper machine, measuring of specialty paper, paperboard, cardboard, corrugated board and end-product properties.

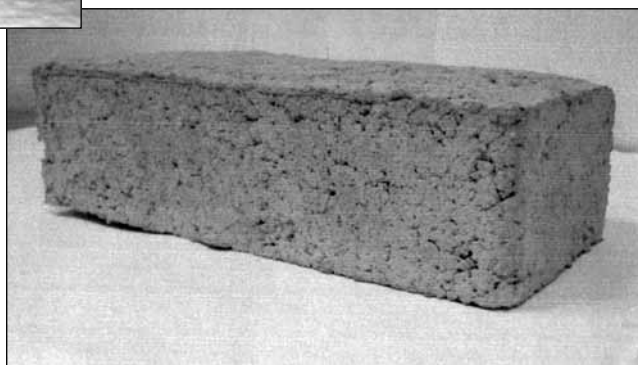
During the whole year we were actively engaged in solving different ecological problems of paper mills and performed chemical and biological analyses for customers. We studied the phenomenon of biofilm and slime occurrence as well as bed odour emissions on account of microbiological degradation processes which all contributes to runnability and product quality problems. We evaluated microbiological contamination of process waters and end-products of different Slovenian paper producers. We offered support to technologists by biocide Persan applications as well as verified possible new applicabilities for Persan and hydrogen peroxyde in papermaking systems. By the help of the newly obtained instrumental analytical equipment (GC-MS technique) we managed to extend the number of parameters for evaluation in process waters

Directive 2000/60/EC, kateri je zavezana tudi Slovenija, bo v prihodnosti potreben poostren nadzor nad emisijami tovrstnih spojin.

Aktivno smo se vključevali v reševanje problematike odpadnih blat, predvsem sekundarnih, ki nastajajo na bioloških čistilnih napravah. Kot perspektivna se je pokazala možnost mešanja slednjih z odpadnimi lesnimi pepeli, pri čemer lahko dobimo uporaben in tržno zanimiv produkt, primeren za različne aplikacije v gradbeništvu.. Biološka blata so za okolje zelo obremenjujoč odpadki, ker povzročajo visoke emisije toplogrednih plinov. Ravnanje z odpadki z visoko vsebnostjo organske snovi bo odslej regulirano s strožjo zakonodajo, zato je nujno potrebno vpeljevati alternativne rešitve (info.: mag. Janja Zule).

as well as fiber, paper and solid waste leachates. We primarily focused on identification and quantification of endocrine disruptors, which change functioning of hormone system and are thus harmful for health. The compounds, appearing in papermaking streams which are potential disruptors are phthalates, polycyclic aromatic hydrocarbons, alkylphenols and pentachlorophenol. They originate from additives, adhesives, printing inks, antifoamers, detergents, emulsifiers and biocides. In accordance with the EU Water Framework Directive 2000/60/EC which is also obligatory for Slovenia, a stricter control of emissions of such compounds is required.

Solid waste management also took much of our attention. We focused mostly on secondary sludge which is generated on biological water treatment plants. Mixtures of biosludge and wood ash proved to be very promising for further application, in particular in building industry. Biosludges are environmentally detrimental because they cause high emissions of green house gases due to deterioration process. Management of sludges with high content of organic matter will be regulated by stricter legislation from now on, so it is of the utmost importance to seek for alternative ways of their handling (info: Janja Zule, M.Sc.)



Laboratorij za papirništvo

Laboratory for papermaking

Že v šestdesetih letih prejšnjega stoletja smo postavili laboratorij za fizikalne meritve in tehnološka preizkušanja. Je edinstven laboratorij v Sloveniji, ki omogoča tako širok spekter preizkušanja papirniških materialov. Kot »Center za papirništvo, grafično in embalažno dejavnost ter ohranjanje dediščine na papirju« smo za laboratorij za papirništvo pridobili koncesijski infrastrukturni program za 6 letno obdobje (2009-2014).

V letu 2008 smo nadaljevali uspešno sodelovanje z industrijo v nekaterih tehnoloških projektih. Poleg tega smo naredili tudi nekaj pilotnih preskusov površinskega oplemenitenja na DowCoater-ju, oziroma smo izvedli vrsto pilotnih poizkusov površinskega oplemenitenja papirja. V sodelovanju z restavratorskim društvom Slovenije smo na PS-ICP izdelali različne vrste trajnih oz. arhivskih papirjev, predvsem za zaščito gradiva ter izdelava specialnih tesnilnih materialov, v slovenskih galerijah, knjižnicah in muzejih.

Uspešno smo delovali na področju monitoringa odpadnih voda ter na področju monitoringa in ocen odpadkov. Slednjih je na naše veselje vedno več, kar kaže na dobro perspektivnost tega področja tudi v prihodnje.

Tako smo v letu 2008 opravili sortirne analize za 11 odlagališč komunalnih odpadkov, prav tako pa je bilo izvedeno nad 80 ocen odpadkov, ki so bili namenjeni za odlaganje ali sežigo oz. pretvorbo v goriva (info.: Edvard Podobnik).

Večino analitskih metod imamo akreditiranih, po SIST EN ISO/IEC 17025:2005.

Podlage za oceno odpadkov so :

- Zakon o varstvu okolja (Ur.l. RS, št. 41/2004, 39/2006),
- Uredba o odlaganju odpadkov (Ur.l. RS, št. 32/2006, Ur.l. RS, št. 98/2007),
- Pravilnik o sežiganju odpadkov (Ur.l. RS, št. 32/2000),
- Uredba o predelavi nenevarnih odpadkov v gorivo (Ur.l. RS, št. 57/2008).

Za 11 deponij v Sloveniji smo opravili ločilne analize (Ur. l. RS, št. 32/2006, priloga 5) za sestavo odpadkov, določili smo količine biorazgradljivih odpadkov (info.: Edvard Podobnik). (napisati v nogo)

The laboratory for physical measurements and technological testings was established already in the 60s of the past century. It is a unique laboratory in Slovenia which enables a wide range of measurements of fibrous materials. As a »Center for papermaking, graphics, packaging and preservation of heritage on paper« we obtained for the laboratory concessionary infrastructural programme for the period of 6 years (2009-2014).

In 2008 we continued successful cooperation with industry in different areas. We accomplished several pilot experiments of paper surface treatment on DowCoater. In cooperation with the Slovenian Association of Restorers we manufactured on the ICP-PM different durable or archival types of paper for preservation purposes in Slovenian galleries, libraries and museums.

We performed regular duties as far as waste water and solid waste monitoring as well as waste assessments are considered. The latter is getting ever more important, which is a very encouraging fact which points to our further intensified activities.

In 2008 we conducted waste sorting analyses for 11 domestic waste landfills as well as over 80 evaluations of different wastes intended for deposition, incineration or conversion to fuel.

Most of applied analytical methods are accredited according to SIST EN ISO/IEC 17025:2005.

The basis for waste evaluations are:

- Environmental Protection Act (Ur.l.RS, št. 41/2004, 39/2006)
- Regulation on waste disposal (Ur.l.RS, št. 32/2006, Ur.l.RS 98/2007)
- Rules on incineration of waste (Ur.l.RS, št. 32/2000)
- Regulation on processing of nonhazardous waste to fuel (Ur.l.RS, št. 57/2008)

For 11 Slovenian landfills we performed separation analyses (Ur.l.RS, št. 32/2006) for characterization of waste composition and determination of biodegradable portion.


We are involved in research and analyses of materials, produced by mixing of biosludges from water treatment

Sodelujemo tudi na raziskavah in meritvah materialov, ki jih proizvedemo z mešanjem bioblat iz bioloških čistilnih naprav papirne industrije in lesnih pepelov, kot možnost izkoriščanja odpadkov v aplikativne namene. Tako pripravljene materiali so primerni za prekrivanje odlagališč, za saniranje degradiranih površin in kot osnova za manj obremenjene ceste ter kot dnevna in sanitarna prekrivka.

Na žalost je potrebno omeniti, da smo konec leta 2008 zaradi nesrečnega spleta okoliščin izgubili pooblastilo za izvajanje prvih meritev in obratovalnega monitoringa odpadnih voda. Tako do jeseni 2010 ne moremo opravljati omenjenih meritev v okviru koncesijske pogodbe (info.: Sebastjan Žvipelj)

plants of papermaking industry with wood ashes. The newly obtained materials are used in different applications, such as landfill covering, sanation of degraded land, base layers in secondary road construction, daily and sanitary coverings.

It should be mentioned that at the end of 2008 we lost due to unfortunate circumstances authorization for the implementation of initial measurements and operational monitoring of waste waters. Consequently, we can not perform monitoring according to the concession contract untill autumn of 2010 (info: Sebastjan Žvipelj).



**SLOVENSKA
AKREDITACIJA**

št. / no. LP - 058

**akreditacijska listina
accreditation certificate**

Inštitut za celulozo in papir
Laboratorij za papirništvo, Bogjišičeva 8, 1000 Ljubljana

Organizacija je akreditirana pri Slovenski akreditaciji (SA), kot preskuševalni laboratorij. S to listino se priznava izpolnjevanje zahtev standarda **SIST EN ISO/IEC 17025:2002** za dejavnosti, ki so opisane v prilogi te listine, označeni z isto številko.

Datum prve podelitve akreditacije: 28. januar 2005

Akreditacijska listina velja do: 27. januar 2009

Ta akreditacija velja do navedenega datuma pod pogojem, da akreditirani organ izpolnjuje zahteve SA za akreditacijo.

Slovenska akreditacija (SA) je podpisnica sporazumov o medsebojnem priznavanju akreditacij na področju kalibracijskih in preskuševalnih laboratorijev pri Evropskem združenju za akreditacijo (EA) in pri Mednarodnem združenju za akreditiranje laboratorijev (ILAC).

The above entity has been accredited by Slovenian Accreditation (SA) as a testing laboratory. This is to signify compliance with the requirements of the Standard SIST EN ISO/IEC 17025:2002 for the approved scope of accreditation as described in the Annex hereto marked with the same number.


Initial accreditation date: 28 January 2005

This certificate is valid until: 27 January 2009


This accreditation shall remain in force until the above date subject to continuing compliance with SA accreditation requirements.

Slovenian Accreditation (SA) is a signatory of the Multilateral Agreements of the European Cooperation for Accreditation (EA) and International Laboratory Accreditation Co-operation (ILAC) for calibration and testing.

Ljubljana, 28. januar 2005



dr. Boštjan Godec
Direktor / Director



Objave raziskovalcev v letu 2008

Publications in 2008

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